20070824.ba v04_n081.bam.20070824

>From ???@??? Fri Aug 24 23:55:53 2007 -0500
Date: Fri, 24 Aug 2007 23:54:50 CDT
From: Old Tube Radios <boatanchors@theporch.com>
To: Old Tube Radios <boatanchors@theporch.com>
Subject: BOATANCHORS digest 4081
Message-Id: <20070825045453.69663318106@srvr1.theporch.com>

BOATANCHORS Digest 4081

Topics covered in this issue include:

1) Re: No doghouse, but a dog's breakfast
by "Arden Allen" <gumbear@pacbell.net>
2) Re: No doghouse, but a dog's breakfast
by "JAMES HANLON" <knjhanlon@msn.com>
3) Re: Kicking the 6AH6 dead horse
by wb3fau@att.net
4) Re: No doghouse, but a dog's breakfast
by wb3fau@att.net
5) Re: Kicking the 6AH6 dead horse
by "Tom Rauch" <w8ji@contesting.com>
6) Re: No doghouse, but a dog's breakfast
by Roy Morgan <roy.morgan@nist.gov>
7) coil winder info
by "John Gillespie" <jgillespie@porchlight.ca>
8) Re: No doghouse, but a dog's breakfast
by wb3fau@att.net
9) Re: BOATANCHORS digest 4080
by Roy Morgan <roy.morgan@nist.gov>
10) Re: No doghouse, but a dog's breakfast
by ail0@att.net
11) Re: Kicking the 6AH6 dead horse
by "Morris Odell" <vilgotch@bigpond.net.au>
12) coil winder experience
by "Morris Odell" <vilgotch@bigpond.net.au>
13) Re: Kicking the 6AH6 dead horse (long winded harangue)
by "Arden Allen" <gumbear@pacbell.net>
14) Re: Kicking the 6AH6 dead horse (long winded harangue)
by Steve Berg <wa9jml@tbc.net>

Message-ID: <000d01c7e5ff$f8013b80$7fa0480c@KB6NAX>
From: "Arden Allen" <gumbear@pacbell.net>
To: Old Tube Radios <boatanchors@theporch.com>
Subject: Re: No doghouse, but a dog's breakfast
Date: Thu, 23 Aug 2007 20:36:27 -0700

```
MIME-Version: 1.0
Content-Type: text/plain;
     charset="iso-8859-1"
Content-Transfer-Encoding: 7bit

> Well every collection needs one, .......

Morris, first things first.  The dog won't go hungry and will be happy to
share your house with you.  If it were mine I'd get plenty of dog biscuits
and settle down for a total strip out and rebuild.  5 or M?  Make it into a
one-of-kind.  They say mutts are the best pets ;-)

Arden Allen
KB6NAX

------------------------------
Message-ID: <BAY110-DAV2DA76FBE3EB8AE18ECBEFA0D70@phx.gbl>
From: "JAMES HANLON" <knjhanlon@msn.com>
To: Old Tube Radios <boatanchors@theporch.com>
Subject: Re: No doghouse, but a dog's breakfast
Date: Thu, 23 Aug 2007 22:27:57 -0600
MIME-Version: 1.0
Content-Type: multipart/alternative;
     boundary="----=_NextPart_000_0137_01C7E5D4.DAF73510"

This is a multi-part message in MIME format.

------=_NextPart_000_0137_01C7E5D4.DAF73510
Content-Type: text/plain;
     charset="iso-8859-1"
Content-Transfer-Encoding: quoted-printable

Morris,

I'd be tempted to rebuild your HRO with metal octal tubes.  That way you =
wouldn't have to worry about finding tube shields.  For the IF amplifier =
tubes which have grid cap leads that come out of the IF transformer =
cans, I'd use 6K7's.  6SK7's or 6K7's would be a good choice for the RF =
amplifier tubes, depending on whether you needed single-ended or =
grid-capped versions.  As late as the HRO-7, National was still using a =
6J7 as the mixer. =20

I have an HRO Senior that has been recapped nicely and an HRO-5TA1 that =
I'm not sure about right now, it may have been recapped as well.  At any =
rate, I'd be glad to take pictures of them below the chassis if you want =
to see how parts are oriented and wiring is dressed.  I also have a =
couple of dog-house power supplies.  I'll take a few pictures and make a =
few measurements for you as soon as I can.
```

Sorry you have so much work to do, but the end result should be well =
worth it.

73,

Jim, W8KGI
------=_NextPart_000_0137_01C7E5D4.DAF73510
Content-Type: text/plain; charset=us-ascii
Content-Transfer-Encoding: 7bit

```
* * * * * * * * * * * * * * * * * * * * * * * * * * * * * *
*         ---REMAINDER OF MESSAGE TRUNCATED---             *
*     This post contains a forbidden message format        *
*  (such as an attached file, a v-card, HTML formatting)   *
*    Mail Lists at theporch.com only accept PLAIN TEXT     *
* If your postings display this message your mail program  *
* is not set to send PLAIN TEXT ONLY and needs adjusting   *
* * * * * * * * * * * * * * * * * * * * * * * * * * * * * *
```

------=_NextPart_000_0137_01C7E5D4.DAF73510--

From: wb3fau@att.net
To: Old Tube Radios <boatanchors@theporch.com>
Cc: "Arden Allen" <gumbear@pacbell.net>
Subject: Re: Kicking the 6AH6 dead horse
Date: Fri, 24 Aug 2007 13:50:28 +0000
Message-Id:
<082420071350.22651.46CEE224000C03040000587B21587667209A0E00CC0D99@att.net>

I realize there is a pinout difference with the 6BZ6, and other similar types.
6AU6, 6DC6,
6GM6, and others which is best of these in the application HF rx. for RF and
IF. Russ.

From: wb3fau@att.net
To: Old Tube Radios <boatanchors@theporch.com>
Cc: "Morris Odell" <vilgotch@bigpond.net.au>
Subject: Re: No doghouse, but a dog's breakfast
Date: Fri, 24 Aug 2007 14:24:25 +0000
Message-Id:
<082420071424.28012.46CEEA190007BFC200006D6C21587667209A0E00CC0D99@att.net>

Just turn to the catalog section of your ARRL handbook, lots of cool Millen and
NC parts.

Message-ID: <007d01c7e65e$713b3b50$640fa8c0@radioroom>
From: "Tom Rauch" <w8ji@contesting.com>
To: Old Tube Radios <boatanchors@theporch.com>
Subject: Re: Kicking the 6AH6 dead horse
Date: Fri, 24 Aug 2007 10:52:41 -0400
MIME-Version: 1.0
Content-Type: text/plain;
     format=flowed;
     charset="iso-8859-1";
     reply-type=original
Content-Transfer-Encoding: 7bit

>I realize there is a pinout difference with the 6BZ6,
>and other similar types. 6AU6, 6DC6,
> 6GM6, and others which is best of these in the
> application HF rx. for RF and IF. Russ.

For maximum dynamic range and good performance in stages where gain is varied either manually or through AVC/AGC, the tube has to a linear transfer function over a wide range of grid bias.

This is generally accomplished by winding the control grid in a tapered pitch so different areas of the grid come into play at different bias voltages. The mu of the tube actually changes with bias, and this allows the gain to change over a wide range without adding nonlinearity or distortion.

You want a remote (or at least a semi-remote) tube, or what might be called a variable mu tube.

The 6AH6 and other similar tubes (like the 6HS6) are sharp cutoff, which means they make good multipliers, clippers, limiters, or mixers. Anything that switches hard and goes into clipping fast fits these applications.

If the stage isn't gain controlled and rarely sees extremes in dynamic range or multiple signals of wide amplitude variations a sharp cutoff tube will be OK, but as a general rule you want to avoid them in RF and IF amps. FM receivers for example use sharp cutoff tubes in IF stages since hard limiting of amplitude changes is good.

After you select that and some other obvious stuff like operating voltages, you want to look at transconductance. In general a higher transconductance is best, although there are other important factors that can come into play.

Of the tubes you listed the 6BZ6 and 6GM6 are semi-remote cutoff, and the 6GM6 has a transconductance of 13,000. It would, as a general rule, be better than the 6BZ6 which is around 8000. The 6GM6 also has a dissipation of around 3 watts, allowing higher anode dissipation and that should allow improved strong signal characteristics.

You really want to stick with a remote cutoff if possible, or at least a semi-remote cutoff, in any AGC controlled stage.

73 Tom

Message-Id: <6.0.0.22.2.20070824103058.02e9ca88@mailserver.nist.gov>
Date: Fri, 24 Aug 2007 10:59:57 -0400
To: Old Tube Radios <boatanchors@theporch.com>
From: Roy Morgan <roy.morgan@nist.gov>
Subject: Re: No doghouse, but a dog's breakfast
Cc: "Morris Odell" <vilgotch@bigpond.net.au>
Mime-Version: 1.0
Content-Type: text/plain; charset="us-ascii"; format=flowed

At 07:13 PM 8/23/2007, "Morris Odell" <vilgotch@bigpond.net.au> wrote:
>Subject: No doghouse, but a dog's breakfast
>...I finally got my first HRO! It looked pretty good from the outside and
>came with a set of 9 coil boxes and a homebrew PS. ...   inside - yikes!!

Morris,

Congratulations on your HRO. You are VERY lucky to get so many coil sets. Some of them are basically unobtainable, or if you do find one, the price is over $100US.

>...the under chassis work is terrible! Messy wiring, great blobs of
>solder, clumsy work-arounds, frayed electrical tape, scorched insulation -
>it's a real dog's breakfast.

I suggest you undertake a complete rebuild. There two reasons I say this:
  - You will be very pleased with the results, both the thing's condition and how it works.
  - You will inspire me to do mine! Though I do have an "advantage".

Here's my story, briefly:

Some years ago now I bought an HRO-5T that had been started along it's trip toward restoration. It had been almost completely dismantled. The things missing/gone from the chassis were:

- all resistors, capacitors, and the like
- all tubes
- all wiring
- the doghouse supply

Remaining were:

- all major parts: tuning system, coil cans, tube sockets, switches
- a bag of parts
- tubes
- a newly made wiring harness, not installed.

This radio used the octal tubes (double ended ones in some cases) and is not the earlier one yours used to be with 6- and 7-pin tubes.

Trouble is, the former owner's dog had chewed the new, all-one-color, Teflon wire harness and that was the end of the project. So, I have a do-it-yourself HRO-5 KIT! I plan to rebuild the thing, using new period type wire for the most part, and all new modern parts.

>...The chrome plated crystal is there but rattles slightly.

It SHOULD rattle slightly. The crystal floats between metal plates and is not held in firmly as in the FT-243 holders. You may need or want to clean the parts carefully, but expect it to work just fine after that, rattle and all.

>I would love to restore it completely. Tubes & sockets are no problem but
>the tube shields are gone and very hard to replace -

Bravo to you, and to carry on. You may find the metal shields at:
Play Things of the Past
http://www.oldradioparts.com/
Same with what may have been ceramic 6- and 7- pin sockets. The octal sockets in my radio are ceramic and are unique in style. They can be found, and I'd hope for the same for the older sockets.

>... The other option is to competently convert it to a M and try not to
>look at the tube designations still on the chassis.

Naww. Go for original. You will not wind up with a 1960's R-390A anyway. If you get it running as new (or better) it will be wonderful. To get better performance, go find a later radio.

>... I would love to find a doghouse PS but in its absence, the
>measurements of the box would be nice so I can at least build a repro.

Are you going to build TWO, maybe? heheh. I would love to find one, or build a reproduction, also. I think there was one on eBay a while back, but the selling price was way above my limit.

>Anyone have any tube shields that would at least look original?

Yes, but I can't find them. Don't give up on that, though. My local antique radio club has an auction monthly where radios with those shields sometimes sell for very modest prices. They also have modest prices on tested tubes of that era.

My bottom line advice:

To a total rebuild. Strip the chassis completely, replate it, and start all over. New parts (yes, yellow capacitors) and wire. Restore to original circuit, tubes, and hardware where you can get it.

Roy

- Roy Morgan, K1LKY since 1959 - Keep 'em Glowing
13033 Downey Mill Road, Lovettsville, VA 20180
Phone 540-822-5911   Cell 301-928-7794
Work: Voice: 301-975-3254, Fax: 301-975-6097
roy.morgan@nist.gov --

Message-ID: <000001c7e661$83ab3440$eb30bb40@k9a1e1>
From: "John Gillespie" <jgillespie@porchlight.ca>
To: Old Tube Radios <boatanchors@theporch.com>
Subject: coil winder info
Date: Fri, 24 Aug 2007 11:10:04 -0400
MIME-Version: 1.0
Content-Type: text/plain;
     charset="Windows-1252"
Content-Transfer-Encoding: 7bit

Several have asked for the links to the various coil winders. Its http://www.antiqueradioarchives.com/archives_index.htm (there is an underscore between archives_index that doesn't appear on my hyperlink). There are two links on this index. The first is from Radio Craft magazine December 1935, its really the basis for all the others, and pretty informative. The second is a coil winder designed and built by Lloyd Godsey KK7IZ, its really detailed and complete with drawings. The third is available from Lindsay publications.

Basically all the coil winders are the same. To quote the Radio Craft article "perhaps the most important single unit is the cam which controls the feeding of the wire back and forth as the coil revolves. The feed should travel back and forth once, while the coil revolves almost one full revolution". The other important point is that all the shafts need to be parallel and have almost no play, anywhere.

The most difficult part for me before starting, was what to use for the gears or pulleys. They need to have a ratio of about 15 to 14 (and 15 to 12 is acceptable also). The gear set used by L. Godsey looked great but it would cost lots, so that was out. I have a large junque box of old radio parts and found tuner drive pulleys of various diameters. I ended up using a 2 1/8" dia for the drive and a 1 7/8" dia for the cam. The pulleys use 1/4" tuner shafts, so I purchased some steel rod at Princess Auto $5 for a 5 foot length. I had recently scrapped an old Hammond solid state organ that had lengths of thin gauge angle iron. 3/4" X 1" X 1/16". For the cam I had some plastic plumbing pipe 2 1/4 OD. I turned up a hardwood plug to slide onto the cam shaft and the various cams press fit onto the plug. For bearings I had some tuner shaft bushings, they use 3/8" dia holes and bolt into the 1/16" angle and give about a 1/2" of bearing surface each. To prepare the angles the various articles suggest clamping the angles together and drilling once. Its a good idea. To assemble the frame work, I welded the angles together. This is tricky if you're not familiar with how heat distorts. Once the frame is assembled and the shafts and cam run freely (they need to run like they where made by Collins or James Millen, precision is the key). The next step was to build the feed. I made up a hardwood block similar to Godseys and used a length of brass bar. I assembled a little 1/2" dia. aluminum drive pulley wheel above the brass bar to guide the wire. The feed at the coil was made from a nylon covered paperclip. The whole unit took several days to assemble, at almost no expense. The end product works great and I was able to rewind the RF coil with little difficulty. That first coil was 1/8" wide and wound using #42 AWG. This winder will be able to rewind IF coils in the future, no problem. This winder will be able to wind coils from 1/8" to a little over 1" wide.

The only problem I encountered, was that the wire sometimes slips off the outer edges. I had to eliminate every bit of play to reduce it. The finished coil took 470 turns and probably 10 turns slipped off. Not too bad for a first attempt. I wonder if they used some type of resin in production to create some stickiness to help prevent this. I am not sure how to upload pics to old tube radios, so if anyone wants to see a pic I can send it you personally. This was a project I am glad I made, repairing coils has always been a pain in the past, this should help alot...... john

----

From: wb3fau@att.net
To: Old Tube Radios <boatanchors@theporch.com>
Cc: Roy Morgan <roy.morgan@nist.gov>, "Morris Odell" <vilgotch@bigpond.net.au>
Subject: Re: No doghouse, but a dog's breakfast
Date: Fri, 24 Aug 2007 15:17:10 +0000

Message-Id:
<082420071517.26508.46CEF6760005032F0000678C21587667209A0E00CC0D99@att.net>

Dog ate the wiring harness- heres a different solution- instead of a doghouse power supply,
why not a "dog" power supply?   Kill the dog, have him stuffed, leave room for power supply components, run the wires out his ass. Apply for new patents- "Dog Power Supply" for your HRO receiver.   i once had a shepard who ate a transistor radio, he died, no, I did not kill him. Glad it was not tubes...Russ.

Message-Id: <6.0.0.22.2.20070824111224.02745d70@mailserver.nist.gov>
Date: Fri, 24 Aug 2007 11:56:59 -0400
To: Old Tube Radios <boatanchors@theporch.com>
From: Roy Morgan <roy.morgan@nist.gov>
Subject: Re: BOATANCHORS digest 4080
Cc: "Arden Allen" <gumbear@pacbell.net>
Mime-Version: 1.0
Content-Type: text/plain; charset="us-ascii"; format=flowed

At 07:13 PM 8/23/2007, you wrote:
>I also would like to know more about what it takes to build a universal coil winder.

Arden,

There are a couple of winder articles on the net:

Radio Craft, December 1935 article posted by Lloyd Godsey KK7IZ:
"How to Make a Simple Coil Winder"
by Paul Rosekrans
<http://www.antiqueradioarchives.com/Coil%20Winder/Coil%20winder.pdf>

Coil winder. By Lloyd Godsey KK7IZ
<http://www.antiqueradioarchives.com/Coil%20Winder-%20KK7IZ/COIL%20WINDER-KK7IZ.pdf>

The Lindsay Books publication:
" Build a Universal Coil Winding Machine"
by Dave Gingery
http://www.lindsaybks.com/dgjp/djgbk/coil/index.html

A winder for one-layer coils, hand fed:
http://solomonsmusic.net/coil_winder.html
"Build a Coil Winder"
by Larry J. Solomon

Kees Talen's web page
Radio Homepage   http://www.qsl.net/k5bcq/
has:
" Get/Make a "Coilmaster"
Shows "The New Modern Coilmaster" made by MoReCo, Inc. of Council Bluffs, Iowa and a couple of alternatives ....a homebrew coil winder, and a coil winder using a hand drill. If you want to wind your own coils, and many people did, you may need to build one of these. Also included are several coil winding hints and suggestions.
http://www.qsl.net/k5bcq/COIL/COIL.html

Roy

- Roy Morgan, K1LKY since 1959 - Keep 'em Glowing
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Phone 540-822-5911   Cell 301-928-7794
Work: Voice: 301-975-3254, Fax: 301-975-6097
roy.morgan@nist.gov --

From: ail0@att.net
To: Old Tube Radios <boatanchors@theporch.com>
Subject: Re: No doghouse, but a dog's breakfast
Date: Fri, 24 Aug 2007 16:46:02 +0000
Message-Id: <082420071646.2048.46CF0B4900072E8000000800216028074 8CF04070E@att.net>

If you are going to rebuild your HRO, log onto SAMS Photofact in Indianapolis (I don't remember their URL, but I bought their PhotoFact for the HRO-50R1, HRO-50T1 two years ago, and they are still in business.) You get all the info including ckt diagrams, parts lists, coil data, alignment instructions, and under-chassis pictures annotated with the parts ID's from the circuit diagrams. I don't remember the cost, but it was in the $25 to $50 range. If you had a repair shop yeseryear, you know what detail these PhotoFact folders contain. They also have PhotoFacts for other boatanchors. One of these days, I will roll up my sleeves and get to work on my HRO-50. My Elmer had an HRO and a SuperPro and I still have a soft place in my heart
for them.
 Art K3HBA, former W2WTJ, W3AEQ.

Message-ID: <004b01c7e69c$75cb68a0$ad00a8c0@Morris1>
From: "Morris Odell" <vilgotch@bigpond.net.au>

To: Old Tube Radios <boatanchors@theporch.com>
Subject: Re: Kicking the 6AH6 dead horse
Date: Sat, 25 Aug 2007 08:16:46 +1000
MIME-Version: 1.0
Content-Type: text/plain;
     format=flowed;
     charset="iso-8859-1";
     reply-type=response
Content-Transfer-Encoding: 7bit

----- Original Message -----
From: "Tom Rauch" <w8ji@contesting.com>
To: "Old Tube Radios" <boatanchors@theporch.com>
Sent: Saturday, August 25, 2007 12:52 AM
Subject: Re: Kicking the 6AH6 dead horse

> >I realize there is a pinout difference with the 6BZ6, and other similar
> >types. 6AU6, 6DC6,
>> 6GM6, and others which is best of these in the application HF rx. for
>> RF and IF. Russ.
>
<snip - treatise on remote cutoff theory deleted>

> The 6AH6 and other similar tubes (like the 6HS6) are sharp cutoff, which
> means they make good multipliers, clippers, limiters, or mixers. Anything
> that switches hard and goes into clipping fast fits these applications.

Quite right - that's why they were used in a lot of industrial equipment,
frequency multipliers etc. My monster HP counter uses lots of them. They're
likely to remain cheap and available as they have no audiophool uses.
>
> If the stage isn't gain controlled and rarely sees extremes in dynamic
> range or multiple signals of wide amplitude variations a sharp cutoff tube
> will be OK, but as a general rule you want to avoid them in RF and IF
> amps.

Also true, but don't forget the discussions we have had here about the use
of a 6AK5 in the front end of receivers such as the R388 and the FRR59A
which has no less than two of them, both AGC controlled. An odd choice, but
those radios work pretty well. Admittedly the FRR59A does have a switched
antenna attenuator for "operator controlled coarse AGC".

> Of the tubes you listed the 6BZ6 and 6GM6 are semi-remote cutoff, and the
> 6GM6 has a transconductance of 13,000. It would, as a general rule, be
> better than the 6BZ6 which is around 8000. The 6GM6 also has a dissipation
> of around 3 watts, allowing higher anode dissipation and that should allow

> improved strong signal characteristics.

The 6GM6 is the 7 pin version of the 6EH7/EF183 frame grid RF pentode. It's a great tube for a front end. I have subbed one in the RF amp position of my R390A where it has improved the sensitivity quite a bit - not a lot of use in today's band conditions, but it's a much hotter Rx. The conversion is not all that easy, you need to change a couple of resistors under the RF deck so I'm not reversing it in a hurry!

73, Morris

Message-ID: <005201c7e69e$d212fef0$ad00a8c0@Morris1>
From: "Morris Odell" <vilgotch@bigpond.net.au>
To: Old Tube Radios <boatanchors@theporch.com>
Subject: coil winder experience
Date: Sat, 25 Aug 2007 08:33:40 +1000
MIME-Version: 1.0
Content-Type: text/plain;
     format=flowed;
     charset="Windows-1252";
     reply-type=original
Content-Transfer-Encoding: 7bit

I made an electronic coil winder from an old printer mechanism afer seeing something similar on the net. It's the spindle and carriage drive from a junked Epson dot matrix printer. The paper drive roll was turned down to its metal core and a couple of collars added so it could be mounted & demounted easily. It's driven by a DC motor from an old printer with a perforated disc and optical sensor. The feeder arm is attached to the print head drive and driven by its stepper. The whole thing is controlled by a microcontroller - you can input the dimensions of the coil and number of turns and away it goes.

I found the tension and feeding pathway for the wire is absolutely critical, and haven't got it exactly right yet myself. To get a successful coil takes a lot of experimentation but it can be done. I've gone through a lot of wire in the course of my experiements :-) When (if) it's finished I'll put up some pics.

Morris

Message-ID: <002701c7e6d2$727b43b0$449e480c@KB6NAX>
From: "Arden Allen" <gumbear@pacbell.net>
To: Old Tube Radios <boatanchors@theporch.com>
Subject: Re: Kicking the 6AH6 dead horse (long winded harangue)
Date: Fri, 24 Aug 2007 21:30:06 -0700

MIME-Version: 1.0
Content-Type: text/plain;
charset="iso-8859-1"
Content-Transfer-Encoding: 7bit

> ....For maximum dynamic range and good performance in stages where gain is varied either manually or through AVC/AGC, the tube has to a linear transfer function over a wide range of grid bias. ....

Tom, let me add a teeny (!) bit to the understanding of gain controlled of RF amps. Whether sharp, semi-remote, or remote cutoff, all types share the same characteristic of their transconductance (gain) being depedent on their plate current. Gain is controlled by varying the control grid, cathode or screen voltage. The difference between sharp cutoff and remote cutoff tubes comes in their abilities to remain "linear" when their gains are substantially reduced. For signals in the few uV amplitude range there is little difference in performance between the two types as the cutoff knee of a sharp cutoff tube is gradual to a very small signal. The problem comes in when tiny signals must be amplified along with higher amplitude signals, the arduous task of RF amplifiers that have to cope with crowded band condtions. The remote cutoff tube handles the problem better by virtue of its cutoff knee being very gradual thus preserving "linearity" for higher amplitude signals. Cross modulation occurs where signals share a non-linear transfer function, the higher the amplitude of the signals the greater the intermodulation of signals. That being said there are notable examples of receivers employing gain controlled sharp cutoff pentode RF amplfiers with generally good performance.

Now if you haven't already put your head scratcher to work let me remind you that so-called non-linear amplifiers act as linear amplifiers when driving tank circuits, the tuned RF and IF coils and transformers needed for selectivity (think class B linear amplifier). Tanks circuits maintain linearity by virtue of their "flywheel" energy storage property regardless of the linearity of the driving amplifier. But the lower the Q of the tank circuit the lower the linearity preservation. There are many compromises required for an RF amplifier to produce adequate gain with reasonably low noise figure, be able to "track" with the local oscillator as the receiver is tuned through a band of frequencies, and still be able to be gain controlled with minimal cross-modulation problems.

Don't forget RF amplifier selectivity is required to obtain IF image rejection. It's not fun to listen to two different frequency bands at the same time! By replacing the RF amp tuneable tank circuit with a wide bandwidth filter and employing a very high first IF frequncy a fixed gain RF amplifier with the ability to withstand huge signal levels is one way to substantially eliminate cross modulation effects. But "huge" amplitude handling ability isn't sufficient when signals from nearby transmitters fall within the front end filter's bandpass, overload is unavoidable.

So then we come to the elimination of RF amplfiers and just strive to have an ultra high amplitude linear mixer as the first stage. As we all should know vacuum tube diodes don't produce very low noise figure mixers and it wasn't until the advent of solid state that reasonably good performance was obtainable from such a front end topology. Today RF amplfiier-less highly linear FET mixers are the cat's heterodyne.

Now perhaps one can understand the multiplicity of RF amp tubes (no pun intended ;-)?

Arden Allen
KB6NAX

Message-ID: <46CFB61D.8000905@tbc.net>
Date: Fri, 24 Aug 2007 23:54:53 -0500
From: Steve Berg <wa9jml@tbc.net>
MIME-Version: 1.0
To: Old Tube Radios <boatanchors@theporch.com>
Subject: Re: Kicking the 6AH6 dead horse (long winded harangue)
Content-Type: text/plain; charset=ISO-8859-1; format=flowed
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What about the Squires Sanders receiver that used a 7360 vacuum tube mixer as the front end? I always wanted one of these, but they were far beyond my modest means as a high school kid in the 1960s. These worked well, from what I heard.

73,

Steve WA9JML

Arden Allen wrote:
>> ....For maximum dynamic range and good performance in stages
>> where gain is varied either manually or through AVC/AGC, the
>> tube has to a linear transfer function over a wide range of
>> grid bias. ....
>
> Tom, let me add a teeny (!) bit to the understanding of gain controlled of
> RF amps. Whether sharp, semi-remote, or remote cutoff, all types share the
> same characteristic of their transconductance (gain) being depedent on their
> plate current. Gain is controlled by varying the control grid, cathode or
> screen voltage. The difference between sharp cutoff and remote cutoff tubes
> comes in their abilities to remain "linear" when their gains are
> substantially reduced. For signals in the few uV amplitude range there is
> little difference in performance between the two types as the cutoff knee of

> a sharp cutoff tube is gradual to a very small signal. The problem comes in when tiny signals must be amplified along with higher amplitude signals, the arduous task of RF amplifiers that have to cope with crowded band condtions. The remote cutoff tube handles the problem better by virtue of its cutoff knee being very gradual thus preserving "linearity" for higher amplitude signals. Cross modulation occurs where signals share a non-linear transfer function, the higher the amplitude of the signals the greater the intermodulation of signals. That being said there are notable examples of receivers employing gain controlled sharp cutoff pentode RF amplfiers with generally good performance.
>
> Now if you haven't already put your head scratcher to work let me remind you that so-called non-linear amplifiers act as linear amplifiers when driving tank circuits, the tuned RF and IF coils and transformers needed for selectivity (think class B linear amplifier). Tanks circuits maintain linearity by virtue of their "flywheel" energy storage property regardless of the linearity of the driving amplifier. But the lower the Q of the tank circuit the lower the linearity preservation. There are many compromises required for an RF amplifier to produce adequate gain with reasonably low noise figure, be able to "track" with the local oscillator as the receiver is tuned through a band of frequencies, and still be able to be gain controlled with minimal cross-modulation problems.
>
> Don't forget RF amplifier selectivity is required to obtain IF image rejection. It's not fun to listen to two different frequency bands at the same time! By replacing the RF amp tuneable tank circuit with a wide bandwidth filter and employing a very high first IF frequncy a fixed gain RF amplifier with the ability to withstand huge signal levels is one way to substantially eliminate cross modulation effects. But "huge" amplitude handling ability isn't sufficient when signals from nearby transmitters fall within the front end filter's bandpass, overload is unavoidable.
>
> So then we come to the elimination of RF amplfiers and just strive to have an ultra high amplitude linear mixer as the first stage. As we all should know vacuum tube diodes don't produce very low noise figure mixers and it wasn't until the advent of solid state that reasonably good performance was obtainable from such a front end topology. Today RF amplfiier-less highly linear FET mixers are the cat's heterodyne.
>
> Now perhaps one can understand the multiplicity of RF amp tubes (no pun intended ;-)?
>
> Arden Allen
> KB6NAX
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End of BOATANCHORS Digest 4081
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